

PATENT ABSTRACTS OF JAPAN

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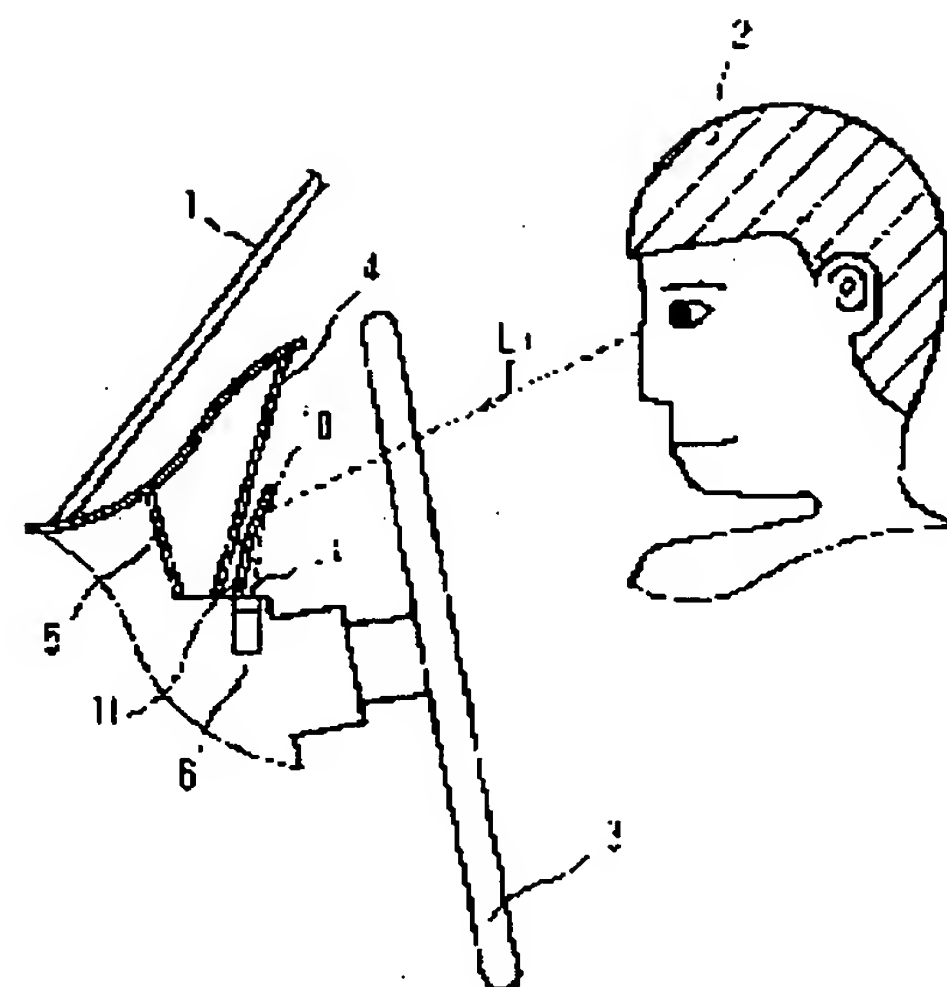
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(54) DRIVER IMAGE PICKUP DEVICE

(57)Abstract:

PURPOSE: To obtain the image pickup device for driver able to pick up an image of a face of a driver without need of an install space of the image pickup device means in the depth direction of an instrument panel.

CONSTITUTION: An image pickup means 6 picking up an image of a driver 2 is installed under or at the side of an instrument panel, and an optical path induction means 10 sending the image of the driver 2 to the image pickup means 6 is installed in a space between the face of the driver 2 and the instrument panel. Furthermore, the optical path induction means 10 is made up of an optical fiber, the input section is installed in a space between the face of the driver 2 and the instrument panel and sends the image of the face of the driver 2 to the image pickup means.



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CLAIMS

[Claim(s)]

[Claim 1] Operator photography equipment characterized by having the optical optical-path guiding means which is installed in the lower part or the side of the instrument panel section, is installed in the space between a photography means to photo an operator, and the above-mentioned operator's face and the above-mentioned instrument panel section, and sends the above-mentioned operator's image to the above-mentioned photography means.

[Claim 2] An optical optical-path guiding means is operator photography equipment given in the 1st term of a claim which is an optical reflective means and is characterized by installing in covering of an instrument panel.

[Claim 3] Operator photography equipment characterized by having the optical fiber with which a photography means to photo an operator, and the input section are installed in the space between the above-mentioned operator's face, and the above-mentioned instrument panel section, and send the above-mentioned operator's image to the above-mentioned photography means.

[Claim 4] The half mirror which reflects further the reflected light of an operator's image illuminated by operator lighting means to illuminate an operator, and this operator lighting means, and sends an operator image, And the optical axis of an above-mentioned operator lighting means for it to be installed in the lower part or the side of the instrument panel section, to have a photography means to photo the operator image reflected by the above-mentioned half mirror, and to pass the above-mentioned half mirror, Operator photography equipment characterized by constituting so that the optical axis of an above-mentioned photography means to reflect with the above-mentioned half mirror may be in agreement.

[Claim 5] It is operator photography equipment given in the 4th term of a claim which an operator lighting means is the photogenic organ of infrared light, and is characterized by a photography means being an infrared camera.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the operator photography equipment which photos operators, such as a car, in order to distinguish a nap of for example, a car operator and a looking-aside condition.

[0002]

[Description of the Prior Art] Conventionally, as equipment which photos an operator, there were some which were carried by JP,60-158303,A, for example. Drawing 7 is the explanatory view showing the arrangement of an important section at the time of using conventional operator photography equipment for the operator of a car from a side face. In drawing, 1 is a windshield and photography equipment with which transparence covering of an instrument panel and 5 were installed in the front face of an instrument panel, and 6 was installed [2 / an operator and 3] in the INSU torr panel front face 5 for a handle and 4, for example, is a camera. This camera 6 is constituted so that image sensors, such as CCD, shall be included and an operator 2 can be photoed through between handles 3.

[0003] Next, actuation of this conventional example is explained. The core of an operator's 2 image is televised with a camera 6 through L1, as a dotted line shows. A camera 6 changes and outputs the image of the operator 2 who received a picture to a picture signal. This picture signal output is sent to an image processing system (not shown) etc., and is further sent to looking aside, the judgment equipment (not shown) of a nap, etc. Although especially the conversion time of a picture signal is not specified, generally every [as a TV signal / every same 1 / same / / 30 seconds] are used.

[0004]

[Problem(s) to be Solved by the Invention] As mentioned above, conventional operator photography equipment is constituted so that a camera 6 may be installed in the direction of a transverse plane of an instrument panel. however, since being restricted narrowly usually came out of depth and there was a location prepared for instrument panel installation, it was difficult to install the camera 6 with long depth. When it is going to install a camera 6 to depth by force, it must stop moreover, having to change the place of the equipment installed in the inner part of an instrument panel in other locations. moreover -- although the problem on arrangement is solvable if a camera 6 is installed ahead of the front face 5 of an instrument panel -- an exterior -- there were troubles, such as becoming unsightly.

[0005] Although there were some which attach the reflective film in a windshield like JP,3-42337,A, and install a camera in instrument panel down in order to solve the above troubles, with this configuration, an operator can take a photograph only from a transverse plane. Although a focus image with the important tip of a jaw etc. is photoed, it is desirable to photo an operator's face image from a lower part a little. However, with conventional equipment, there was a trouble which is the optimal direction that the face image of the operator from a lower part could not be photoed a little.

[0006] This invention was not made in order to solve this trouble, it does not need the installation space of a camera in the depth direction of an instrument panel, but aims at obtaining the operator photography equipment which can photo an operator's face image from the optimal direction.

[0007]

[Means for Solving the Problem] The operator photography equipment concerning invention of this claim 1 is installed in the lower part or the side of the instrument panel section, is installed in the space between a photography means to photo an operator, and an operator's face and the instrument panel section, and is equipped with the optical optical-path guiding means which sends an operator's image to a photography means.

[0008] Moreover, in operator photography equipment given in the 1st term of a claim, an optical optical-path guiding means is an optical reflective means, and the operator photography equipment concerning invention of claim 2 is characterized by installing in covering of an instrument panel.

[0009] Moreover, a photography means by which the operator photography equipment concerning invention of claim 3 photos an operator, and the input section are installed in the space between an operator's face and the instrument panel section, and it has the optical fiber which sends an operator's image to a photography means.

[0010] Moreover, the operator photography equipment concerning invention of claim 4 The half mirror which reflects further the reflected light of an operator's image illuminated by operator lighting means to illuminate an operator, and this operator lighting means, and sends an operator image, And the optical axis of an operator lighting means for it to be installed in the lower part or the side of the instrument panel section, to have a photography means to photo the operator image reflected by the half mirror, and to pass the above-mentioned half mirror, It constitutes so that the optical axis of a photography means to reflect with a half mirror may be in agreement.

[0011] Moreover, it is characterized by for the operator lighting means of the operator photography equipment concerning invention of claim 5 being the photogenic organ of infrared light in operator photography equipment given in the 4th term of a claim, and a photography means being an infrared camera.

[0012]

[Function] With the operator photography equipment constituted as mentioned above, the image of an operator's face is guided to a photography means by the optical optical-path guiding means. since the optical optical-path guiding means is installed in the space between an instrument panel and an operator's face -- an operator -- the image of the face from a lower part can be photoed a little. In addition, it is not necessary to install a photography means in an instrument panel, and a limit is not given to installation space.

[0013]

[Example] The operator photography equipment by one example of this invention is explained about drawing below example 1. Drawing 1 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 1 of this invention from a side face. In drawing, since 1-5 are the same as that of the conventional example, explanation is omitted. 6 is an operator photography means to photo an operator, for example, is a camera. In this example, as for the camera 6, the instrument panel transparence covering 4 is attached caudad. 10 is an optical optical-path guiding means, is installed in the space between an operator's 2 face, and the instrument panel 5, and sends an operator's 2 image to a camera 6. In this example, it is the total reflection mirror which reflects an operator's 2 image, for example, and is attached in the front face of the instrument panel transparence covering 4. 11 is mirror fixed metallic ornaments which fix a total reflection mirror 10, and it is adjusted and it is being fixed so that the image of an operator's 2 face can receive a picture to a camera 6. L1 shows among drawing the optical axis of an operator's 2 image which carries out incidence to a total reflection mirror 10, and L2 shows the optical axis of the reflected light reflected by the total reflection mirror 10.

[0014] Next, actuation is explained. The core of an operator's 2 image passes along L1, and is reflected in the direction of a total reflection mirror L2 by ten. Six is located on a camera L2 and photos an operator's 2 image. A camera 6 changes and outputs an operator's 2 image to a picture signal. This picture signal output is processed like the conventional example.

[0015] since the total reflection mirror 10 is installed in the space between the instrument panel transparence covering 4 and an operator's 2 face in this example -- an operator 2 -- the image of the face from a lower part can be photoed a little. Furthermore, that what is necessary is just the location which can photo the image reflected by the total reflection mirror 10, it becomes unnecessary to install the location of a camera 6 in an instrument panel, and it does not give a limit to installation space.

[0016] In addition, although the include angle of the above-mentioned total reflection mirror 10 is set as immobilization, this include angle may be constituted in adjustable, and a more exact image will be obtained, if it is made to adjust when an operator changes.

[0017] Example 2. drawing 2 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 2 of this invention from a side face. In this example, the total reflection mirror 10 was installed between the instrument panel transparence covering 4 and the instrument panel front face 5, and the camera 6 was installed under the instrument panel of instrument panel transparence covering 4 back. Actuation of photography is the same as that of an example 1.

[0018] According to this example, since there are a camera 6 and a total reflection mirror 10 inside the instrument panel transparence covering 4 in addition to the same effectiveness as an example 1, it is effective in not becoming dirty with dust in the car.

[0019] Example 3. drawing 3 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 3 of this invention from a side face. drawing -- setting -- 1- 6 and 10 are the same as that of an example 1. The total reflection mirror 10 is stuck on the instrument panel transparence covering 4 in this example. A camera 6 is an instrument panel lower part, and is installed in the location which the reflected light by the total reflection mirror 10 of an operator's 2 image can televise. Actuation of photography is the same as that of an example 1.

[0020] According to this example, it is effective in the mirror fixed metallic ornaments 11 which fix a total reflection mirror 10 becoming unnecessary in addition to the effectiveness of an example 1.

[0021] In addition, although the total reflection mirror constituted the optical optical-path guiding means from

the above-mentioned example, even if constituted from a half mirror, there is the same effectiveness as the above-mentioned example.

[0022] Example 4. drawing 4 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 4 of this invention from a side face. In drawing, since 1, 2, 3, and 5 are the same as that of an example 1, they omit explanation. 7 is an operator lighting means, for example, is infrared rays LED etc., and is an infrared photogenic organ which emits light in infrared light and illuminates an operator. This infrared photogenic organ 7 is installed in the INSU vine panel front face 5. 8 is a photography means, for example, the infrared camera which has photography sensibility from a light field to an infrared light field, and 12 are half mirror instrument panel hippo – constituted from the quality of the material used as a half mirror. The infrared camera 8 is the lower part of an instrument panel, and is installed in the location which the reflected light L2 by the half mirror instrument panel hippo –12 of an operator's 2 image can televise. 13 covers the light inputted into the infrared camera 8, it is a light cut-off filter which penetrates infrared light, and the front face of the infrared camera 8 is equipped with it.

[0023] Although the location of a pupil serves as an important parameter in look detection of an operator, if light is irradiated at an eyeball, the reflected light will progress in the direction which irradiated light by reflection of a retina, and if a photograph is taken from the direction which irradiated light, it is known well that a pupil will shine brightly. In this case, it is known well that the light which irradiates an eyeball also has an advantageous near-infrared light. This example uses infrared light with such a description for operator photography equipment.

[0024] In this example, the near-infrared light from the infrared photogenic organ 7 passes along an optical axis L3, passes the half mirror instrument panel hippo –12, and serves as an optical axis L1. On the other hand, if the optical axis L2 of the infrared camera 8 is reflected by the half mirror instrument panel hippo –12, it will become an optical axis L1. In order to use the above-mentioned property, it constitutes so that an optical axis L3 and an optical axis L1 may be in agreement. That is, the include angle theta which an optical axis L3, the include angle theta and optical axis L1 which the half mirror instrument panel hippo –12 forms, the include angle theta and optical axis L2 which the half mirror instrument panel hippo –12 forms, and the half mirror instrument panel hippo –12 make is constituted so that it may become equal substantially altogether.

[0025] Hereafter, actuation of this example is explained. The near-infrared light in which the infrared photogenic organ 7 emitted light irradiates an operator's 2 whole face with an optical axis L1 through the half mirror instrument panel hippo –12 from an optical axis L3. An operator's 2 face image is reflected in the direction of an optical axis L2 by the half mirror instrument panel hippo –12 from an optical axis L1. This operator's 2 image is photoed with the infrared camera 8 through the light cut-off filter 13. Thus, if constituted, the retinal reflex from an operator's 2 face image can be caught.

[0026] According to this example, in addition to the effectiveness of an example 1, it is effective in the ability to catch an operator's 2 retinal reflex correctly.

[0027] Example 5. drawing 5 (a) is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 5 of this invention from the upper part, and drawing 5 (b) is an explanatory view shown from a side face. Although it is the almost same configuration as an example 2, in the example 2, to installing under the instrument panel behind the instrument panel transparence covering 4, as shown in drawing 5, a camera 6 is installed so that an operator's 2 image may reflect a total reflection mirror 10 in the side, and is installing the camera 6 in the side of an instrument panel by this example.

[0028] In this example, the photography means 6 is arranged to the side of an instrument panel, and there is the same effectiveness as the above-mentioned example. namely, -- since the total reflection mirror 10 is installed in the space between the instrument panel transparence covering 4 and an operator's 2 face -- an operator 2 -- the image of the face from a lower part can be photoed a little. Furthermore, that what is necessary is just the location which can photo the image reflected by the total reflection mirror 10, it becomes unnecessary to install the location of a camera 6 in an instrument panel, and it does not give a limit to installation space.

[0029] Example 6. drawing 6 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 6 of this invention from a side face. In drawing, since 1-6 are the same as that of an example 1, they omit explanation. 9 is an optical optical-path guiding means, for example, is an optical fiber. The front face of a camera 6 is equipped with the output section which is the end of this optical fiber 9, and the instrument-panel front face 5 is equipped with the input section which is the other end.

[0030] Next, actuation is explained. Incidence of the core of an operator's 2 image is carried out to the input section of an optical fiber 9 through L1. Furthermore, an image passes through the inside of an optical fiber 9, and can bend an optical path. The light which came out of the other end of an optical fiber 9 goes into a camera 6, and a camera 6 photos an operator's 2 image. A camera 6 changes and outputs an operator's 2 image to a picture signal. This picture signal output is processed like the conventional example.

[0031] In addition, although the installation location of a camera 6 is the lower part of an instrument panel in this example, it does not adhere to this, and it can also place aslant and a limit of an installation can be performed few even in the side. According to this example, it is effective in the ability of the installation location of a

camera 6 to choose freely.

[0032] Moreover, although the half mirror constituted the instrument panel hippo -12 from the example 4, another half mirror may be installed like an example 2 between the instrument panel front face 5 and the instrument panel transparency covering 4.

[0033] Moreover, although the half mirror constituted the instrument panel hippo -12 from the example 4, this half mirror does not need to be the whole instrument panel hippo-surface, and may be a part.

[0034] Moreover, although it constituted from an example 3 so that a total reflection mirror 10 might be stuck on the instrument panel transparency covering 4, you may make it constitute the whole surface or a part of instrument panel hippo - from a half mirror.

[0035]

[Effect of the Invention] As mentioned above, according to invention of claim 1, it is installed in the lower part or the side of an instrument panel. By having been installed in the space between a photography means to photo an operator, and an operator's face and the instrument panel section, and having had the optical optical-path guiding means which sends an operator's image to a photography means Installation space of a camera is not needed in the depth direction of an instrument panel, but it is effective in the operator photography equipment which can photo an operator's face image from the optimal direction being obtained.

[0036] Moreover, in invention of claim 1, an optical optical-path guiding means is an optical reflective means, by installing in covering of an instrument panel, it does not need the installation space of a camera in the depth direction of an instrument panel, but can photo an operator's face image from the optimal direction, and is effective in the operator photography equipment which can prevent becoming dirty with dust in the car further being obtained according to invention of claim 2.

[0037] Moreover, when according to invention of claim 3 a photography means to photo an operator, and the input section were installed in the space between an operator's face and the instrument panel section and were equipped with the optical fiber which sends an operator's image to a photography means Installation space of a camera is not needed in the depth direction of an instrument panel, but an operator's face image can be photoed from the optimal direction, and it is effective in the operator photography equipment which the installation location of a photography means can choose freely being obtained.

[0038] Moreover, an operator lighting means to illuminate an operator according to invention of claim 4, The half mirror which reflects further the reflected light of an operator's image illuminated by this operator lighting means, and sends an operator image, And the optical axis of an operator lighting means for it to be installed in the lower part or the side of an instrument panel, to have a photography means to photo the operator image reflected by the half mirror, and to pass a half mirror, By having constituted so that the optical axis of a photography means to reflect with a half mirror might be in agreement It is effective in the operator photography equipment which cannot need the installation space of a camera in the depth direction of an instrument panel, but can photo an operator's face image from the optimal direction, and can photo an operator's retinal reflex image correctly further being obtained.

[0039] Again. According to invention of claim 5, in invention of claim 4, an operator lighting means is the photogenic organ of infrared light, and by being an infrared camera, a photography means does not need the installation space of a camera in the depth direction of an instrument panel, but can photo an operator's face image from the optimal direction, and is effective in the operator photography equipment which can catch an operator's retinal reflex image correctly being obtained.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the operator photography equipment which photos operators, such as a car, in order to distinguish a nap of for example, a car operator and a looking-aside condition.

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PRIOR ART

[Description of the Prior Art] Conventionally, as equipment which photos an operator, there were some which were carried by JP,60-158303,A, for example. Drawing 7 is the explanatory view showing the arrangement of an important section at the time of using conventional operator photography equipment for the operator of a car from a side face. In drawing, 1 is a windshield and photography equipment with which transparence covering of an instrument panel and 5 were installed in the front face of an instrument panel, and 6 was installed [2 / an operator and 3] in the INSU torr panel front face 5 for a handle and 4, for example, is a camera. This camera 6 is constituted so that image sensors, such as CCD, shall be included and an operator 2 can be photoed through between handles 3.

[0003] Next, actuation of this conventional example is explained. The core of an operator's 2 image is televised with a camera 6 through L1, as a dotted line shows. A camera 6 changes and outputs the image of the operator 2 who received a picture to a picture signal. This picture signal output is sent to an image processing system (not shown) etc., and is further sent to looking aside, the judgment equipment (not shown) of a nap, etc. Although especially the conversion time of a picture signal is not specified, generally every [as a TV signal / every same 1 / same / / 30 seconds] are used.

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EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, according to invention of claim 1, it is installed in the lower part or the side of an instrument panel. By having been installed in the space between a photography means to photo an operator, and an operator's face and the instrument panel section, and having had the optical optical-path guiding means which sends an operator's image to a photography means Installation space of a camera is not needed in the depth direction of an instrument panel, but it is effective in the operator photography equipment which can photo an operator's face image from the optimal direction being obtained.

[0036] Moreover, in invention of claim 1, an optical optical-path guiding means is an optical reflective means, by installing in covering of an instrument panel, it does not need the installation space of a camera in the depth direction of an instrument panel, but can photo an operator's face image from the optimal direction, and is effective in the operator photography equipment which can prevent becoming dirty with dust in the car further being obtained according to invention of claim 2.

[0037] Moreover, when according to invention of claim 3 a photography means to photo an operator, and the input section were installed in the space between an operator's face and the instrument panel section and were equipped with the optical fiber which sends an operator's image to a photography means Installation space of a camera is not needed in the depth direction of an instrument panel, but an operator's face image can be photoed from the optimal direction, and it is effective in the operator photography equipment which the installation location of a photography means can choose freely being obtained.

[0038] Moreover, an operator lighting means to illuminate an operator according to invention of claim 4, The half mirror which reflects further the reflected light of an operator's image illuminated by this operator lighting means, and sends an operator image, And the optical axis of an operator lighting means for it to be installed in the lower part or the side of an instrument panel, to have a photography means to photo the operator image reflected by the half mirror, and to pass a half mirror, By having constituted so that the optical axis of a photography means to reflect with a half mirror might be in agreement It is effective in the operator photography equipment which cannot need the installation space of a camera in the depth direction of an instrument panel, but can photo an operator's face image from the optimal direction, and can photo an operator's retinal reflex image correctly further being obtained.

[0039] Again. According to invention of claim 5, in invention of claim 4, an operator lighting means is the photogenic organ of infrared light, and by being an infrared camera, a photography means does not need the installation space of a camera in the depth direction of an instrument panel, but can photo an operator's face image from the optimal direction, and is effective in the operator photography equipment which can catch an operator's retinal reflex image correctly being obtained.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] As mentioned above, conventional operator photography equipment is constituted so that a camera 6 may be installed in the direction of a transverse plane of an instrument panel. However, since being restricted narrowly usually came out of depth and there was a location prepared for instrument panel installation, it was difficult to install the camera 6 with long depth. When it is going to install a camera 6 to depth by force, it must stop moreover, having to change the place of the equipment installed in the inner part of an instrument panel in other locations. moreover -- although the problem on arrangement is solvable if a camera 6 is installed ahead of the front face 5 of an instrument panel -- an exterior -- there were troubles, such as becoming unsightly.

[0005] Although there were some which attach the reflective film in a windshield like JP,3-42337,A, and install a camera in instrument panel down in order to solve the above troubles, with this configuration, an operator can take a photograph only from a transverse plane. Although a focus image with the important tip of a jaw etc. is photoed, it is desirable to photo an operator's face image from a lower part a little. However, with conventional equipment, there was a trouble which is the optimal direction that the face image of the operator from a lower part could not be photoed a little.

[0006] This invention was not made in order to solve this trouble, it does not need the installation space of a camera in the depth direction of an instrument panel, but aims at obtaining the operator photography equipment which can photo an operator's face image from the optimal direction.

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MEANS

[Means for Solving the Problem] The operator photography equipment concerning invention of this claim 1 is installed in the lower part or the side of the instrument panel section, is installed in the space between a photography means to photo an operator, and an operator's face and the instrument panel section, and is equipped with the optical optical-path guiding means which sends an operator's image to a photography means.

[0008] Moreover, in operator photography equipment given in the 1st term of a claim, an optical optical-path guiding means is an optical reflective means, and the operator photography equipment concerning invention of claim 2 is characterized by installing in covering of an instrument panel.

[0009] Moreover, a photography means by which the operator photography equipment concerning invention of claim 3 photos an operator, and the input section are installed in the space between an operator's face and the instrument panel section, and it has the optical fiber which sends an operator's image to a photography means.

[0010] Moreover, the operator photography equipment concerning invention of claim 4 The half mirror which reflects further the reflected light of an operator's image illuminated by operator lighting means to illuminate an operator, and this operator lighting means, and sends an operator image, And the optical axis of an operator lighting means for it to be installed in the lower part or the side of the instrument panel section, to have a photography means to photo the operator image reflected by the half mirror, and to pass the above-mentioned half mirror, It constitutes so that the optical axis of a photography means to reflect with a half mirror may be in agreement.

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OPERATION

[Function] With the operator photography equipment constituted as mentioned above, the image of an operator's face is guided to a photography means by the optical optical-path guiding means. since the optical optical-path guiding means is installed in the space between an instrument panel and an operator's face -- an operator -- the image of the face from a lower part can be photoed a little. In addition, it is not necessary to install a photography means in an instrument panel, and a limit is not given to installation space.

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EXAMPLE

[Example] The operator photography equipment by one example of this invention is explained about drawing below example 1. Drawing 1 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 1 of this invention from a side face. In drawing, since 1-5 are the same as that of the conventional example, explanation is omitted. 6 is an operator photography means to photo an operator, for example, is a camera. In this example, as for the camera 6, the instrument panel transparence covering 4 is attached caudad. 10 is an optical optical-path guiding means, is installed in the space between an operator's 2 face, and the instrument panel 5, and sends an operator's 2 image to a camera 6. In this example, it is the total reflection mirror which reflects an operator's 2 image, for example, and is attached in the front face of the instrument panel transparence covering 4. 11 is mirror fixed metallic ornaments which fix a total reflection mirror 10, and it is adjusted and it is being fixed so that the image of an operator's 2 face can receive a picture to a camera 6. L1 shows among drawing the optical axis of an operator's 2 image which carries out incidence to a total reflection mirror 10, and L2 shows the optical axis of the reflected light reflected by the total reflection mirror 10.

[0014] Next, actuation is explained. The core of an operator's 2 image passes along L1, and is reflected in the direction of a total reflection mirror L2 by ten. Six is located on a camera L2 and photos an operator's 2 image. A camera 6 changes and outputs an operator's 2 image to a picture signal. This picture signal output is processed like the conventional example.

[0015] since the total reflection mirror 10 is installed in the space between the instrument panel transparence covering 4 and an operator's 2 face in this example -- an operator 2 -- the image of the face from a lower part can be photoed a little. Furthermore, that what is necessary is just the location which can photo the image reflected by the total reflection mirror 10, it becomes unnecessary to install the location of a camera 6 in an instrument panel, and it does not give a limit to installation space.

[0016] In addition, although the include angle of the above-mentioned total reflection mirror 10 is set as immobilization, this include angle may be constituted in adjustable, and a more exact image will be obtained, if it is made to adjust when an operator changes.

[0017] Example 2. drawing 2 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 2 of this invention from a side face. In this example, the total reflection mirror 10 was installed between the instrument panel transparence covering 4 and the instrument panel front face 5, and the camera 6 was installed under the instrument panel of instrument panel transparence covering 4 back. Actuation of photography is the same as that of an example 1.

[0018] According to this example, since there are a camera 6 and a total reflection mirror 10 inside the instrument panel transparence covering 4 in addition to the same effectiveness as an example 1, it is effective in not becoming dirty with dust in the car.

[0019] Example 3. drawing 3 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 3 of this invention from a side face. drawing -- setting -- 1-6 and 10 are the same as that of an example 1. The total reflection mirror 10 is stuck on the instrument panel transparence covering 4 in this example. A camera 6 is an instrument panel lower part, and is installed in the location which the reflected light by the total reflection mirror 10 of an operator's 2 image can televise. Actuation of photography is the same as that of an example 1.

[0020] According to this example, it is effective in the mirror fixed metallic ornaments 11 which fix a total reflection mirror 10 becoming unnecessary in addition to the effectiveness of an example 1.

[0021] In addition, although the total reflection mirror constituted the optical optical-path guiding means from the above-mentioned example, even if constituted from a half mirror, there is the same effectiveness as the above-mentioned example.

[0022] Example 4. drawing 4 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 4 of this invention from a side face. In drawing, since 1, 2, 3, and 5 are the same as that of an example 1, they omit explanation. 7 is an operator lighting means, for example, is infrared rays LED etc., and is an infrared photogenic organ which emits light in infrared light and illuminates an

operator. This infrared photogenic organ 7 is installed in the INSU vine panel front face 5. 8 is a photography means, for example, the infrared camera which has photography sensibility from a light field to an infrared light field, and 12 are half mirror instrument panel hippo – constituted from the quality of the material used as a half mirror. The infrared camera 8 is the lower part of an instrument panel, and is installed in the location which the reflected light L2 by the half mirror instrument panel hippo –12 of an operator's 2 image can televise. 13 covers the light inputted into the infrared camera 8, it is a light cut-off filter which penetrates infrared light, and the front face of the infrared camera 8 is equipped with it.

[0023] Although the location of a pupil serves as an important parameter in look detection of an operator, if light is irradiated at an eyeball, the reflected light will progress in the direction which irradiated light by reflection of a retina, and if a photograph is taken from the direction which irradiated light, it is known well that a pupil will shine brightly. In this case, it is known well that the light which irradiates an eyeball also has an advantageous near-infrared light. This example uses infrared light with such a description for operator photography equipment.

[0024] In this example, the near-infrared light from the infrared photogenic organ 7 passes along an optical axis L3, passes the half mirror instrument panel hippo –12, and serves as an optical axis L1. On the other hand, if the optical axis L2 of the infrared camera 8 is reflected by the half mirror instrument panel hippo –12, it will become an optical axis L1. In order to use the above-mentioned property, it constitutes so that an optical axis L3 and an optical axis L1 may be in agreement. That is, the include angle theta which an optical axis L3, the include angle theta and optical axis L1 which the half mirror instrument panel hippo –12 forms, the include angle theta and optical axis L2 which the half mirror instrument panel hippo –12 forms, and the half mirror instrument panel hippo –12 make is constituted so that it may become equal substantially altogether.

[0025] Hereafter, actuation of this example is explained. The near-infrared light in which the infrared photogenic organ 7 emitted light irradiates an operator's 2 whole face with an optical axis L1 through the half mirror instrument panel hippo –12 from an optical axis L3. An operator's 2 face image is reflected in the direction of an optical axis L2 by the half mirror instrument panel hippo –12 from an optical axis L1. This operator's 2 image is photoed with the infrared camera 8 through the light cut-off filter 13. Thus, if constituted, the retinal reflex from an operator's 2 face image can be caught.

[0026] According to this example, in addition to the effectiveness of an example 1, it is effective in the ability to catch an operator's 2 retinal reflex correctly.

[0027] Example 5. drawing 5 (a) is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 5 of this invention from the upper part, and drawing 5 (b) is an explanatory view shown from a side face. Although it is the almost same configuration as an example 2, in the example 2, to installing under the instrument panel behind the instrument panel transparence covering 4, as shown in drawing 5, a camera 6 is installed so that an operator's 2 image may reflect a total reflection mirror 10 in the side, and is installing the camera 6 in the side of an instrument panel by this example.

[0028] In this example, the photography means 6 is arranged to the side of an instrument panel, and there is the same effectiveness as the above-mentioned example. namely, -- since the total reflection mirror 10 is installed in the space between the instrument panel transparence covering 4 and an operator's 2 face -- an operator 2 -- the image of the face from a lower part can be photoed a little. Furthermore, that what is necessary is just the location which can photo the image reflected by the total reflection mirror 10, it becomes unnecessary to install the location of a camera 6 in an instrument panel, and it does not give a limit to installation space.

[0029] Example 6. drawing 6 is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 6 of this invention from a side face. In drawing, since 1-6 are the same as that of an example 1, they omit explanation. 9 is an optical optical-path guiding means, for example, is an optical fiber. The front face of a camera 6 is equipped with the output section which is the end of this optical fiber 9, and the instrument-panel front face 5 is equipped with the input section which is the other end.

[0030] Next, actuation is explained. Incidence of the core of an operator's 2 image is carried out to the input section of an optical fiber 9 through L1. Furthermore, an image passes through the inside of an optical fiber 9, and can bend an optical path. The light which came out of the other end of an optical fiber 9 goes into a camera 6, and a camera 6 photos an operator's 2 image. A camera 6 changes and outputs an operator's 2 image to a picture signal. This picture signal output is processed like the conventional example.

[0031] In addition, although the installation location of a camera 6 is the lower part of an instrument panel in this example, it does not adhere to this, and it can also place aslant and a limit of an installation can be performed few even in the side. According to this example, it is effective in the ability of the installation location of a camera 6 to choose freely.

[0032] Moreover, although the half mirror constituted the instrument panel hippo –12 from the example 4, another half mirror may be installed like an example 2 between the instrument panel front face 5 and the instrument panel transparence covering 4.

[0033] Moreover, although the half mirror constituted the instrument panel hippo –12 from the example 4, this half mirror does not need to be the whole instrument panel hippo-surface, and may be a part.

[0034] Moreover, although it constituted from an example 3 so that a total reflection mirror 10 might be stuck on the instrument panel transparence covering 4, you may make it constitute the whole surface or a part of instrument panel hippo – from a half mirror.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 1 of this invention from a side face.

[Drawing 2] It is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 2 of this invention from a side face.

[Drawing 3] It is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 3 of this invention from a side face.

[Drawing 4] It is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 4 of this invention from a side face.

[Drawing 5] It is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 5 of this invention from a top face and a side face.

[Drawing 6] It is the explanatory view showing arrangement of the important section of the operator photography equipment by the example 6 of this invention from a side face.

[Drawing 7] It is the explanatory view showing arrangement of the important section of conventional operator photography equipment from a side face.

[Description of Notations]

2 Operator

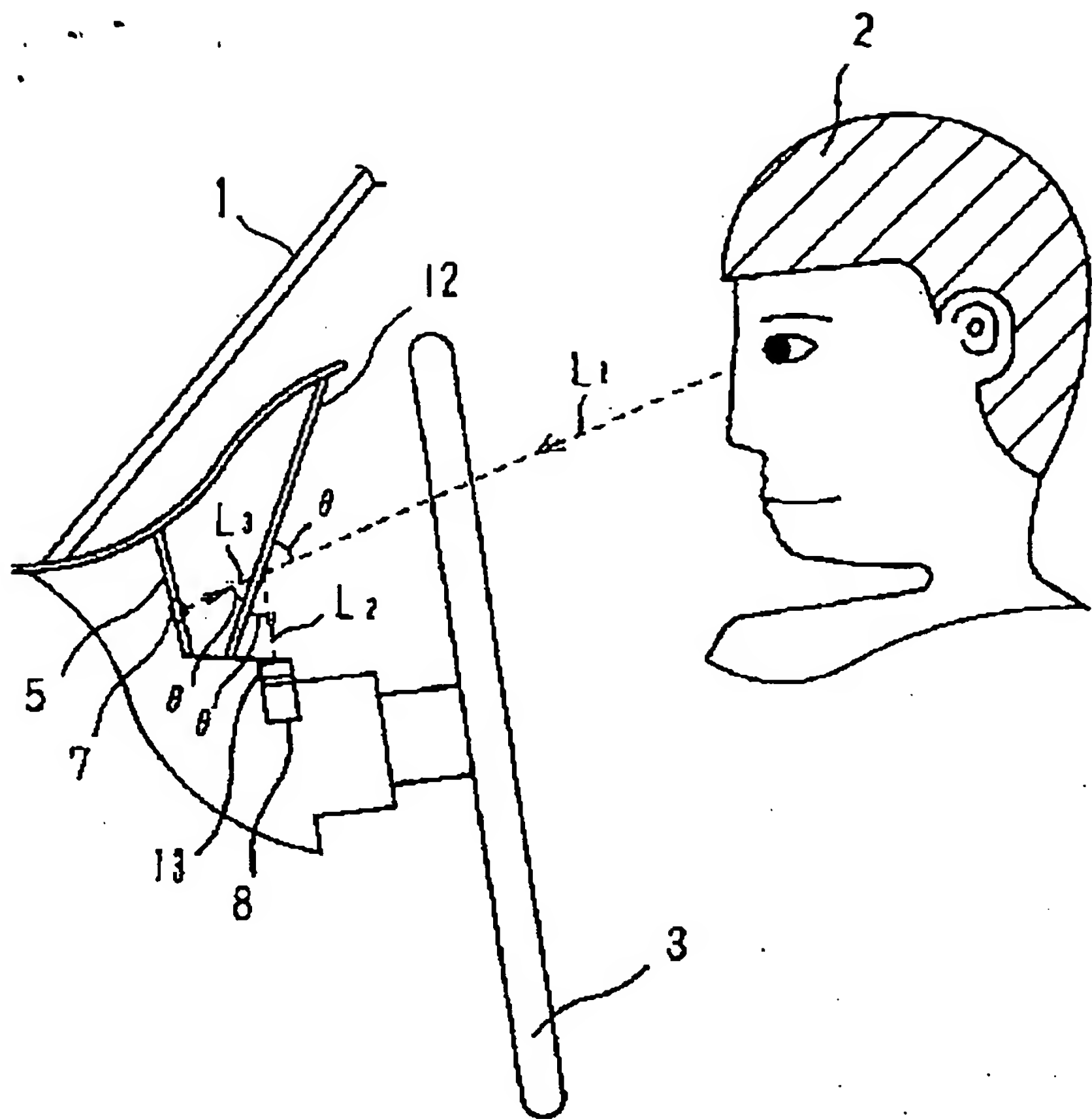
4 Instrument Panel Transparence Covering

5 Instrument Panel Front Face

6 Photography Means

10 Optical Optical-Path Guiding Means

[Translation done.]



[Translation done.]

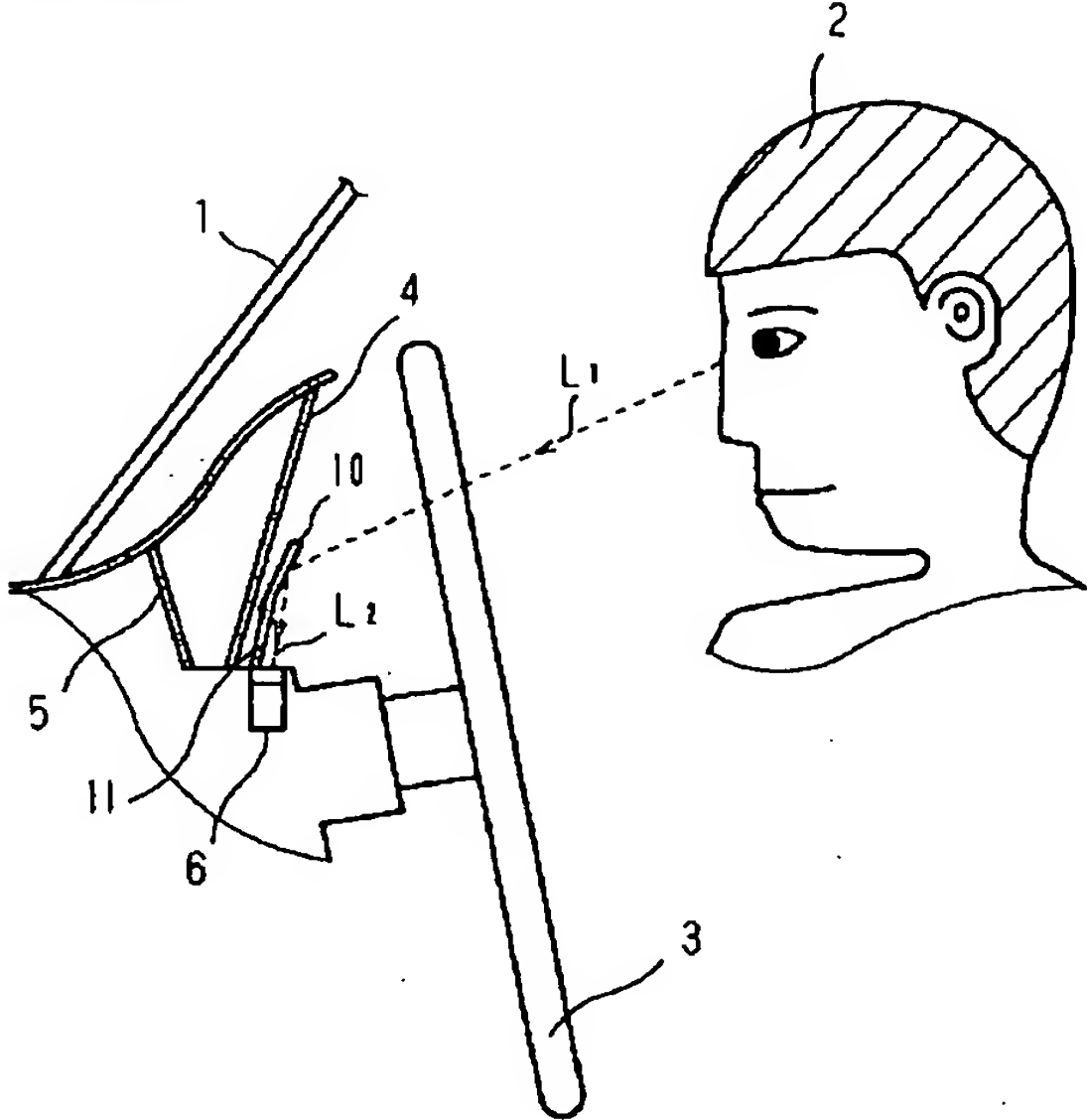
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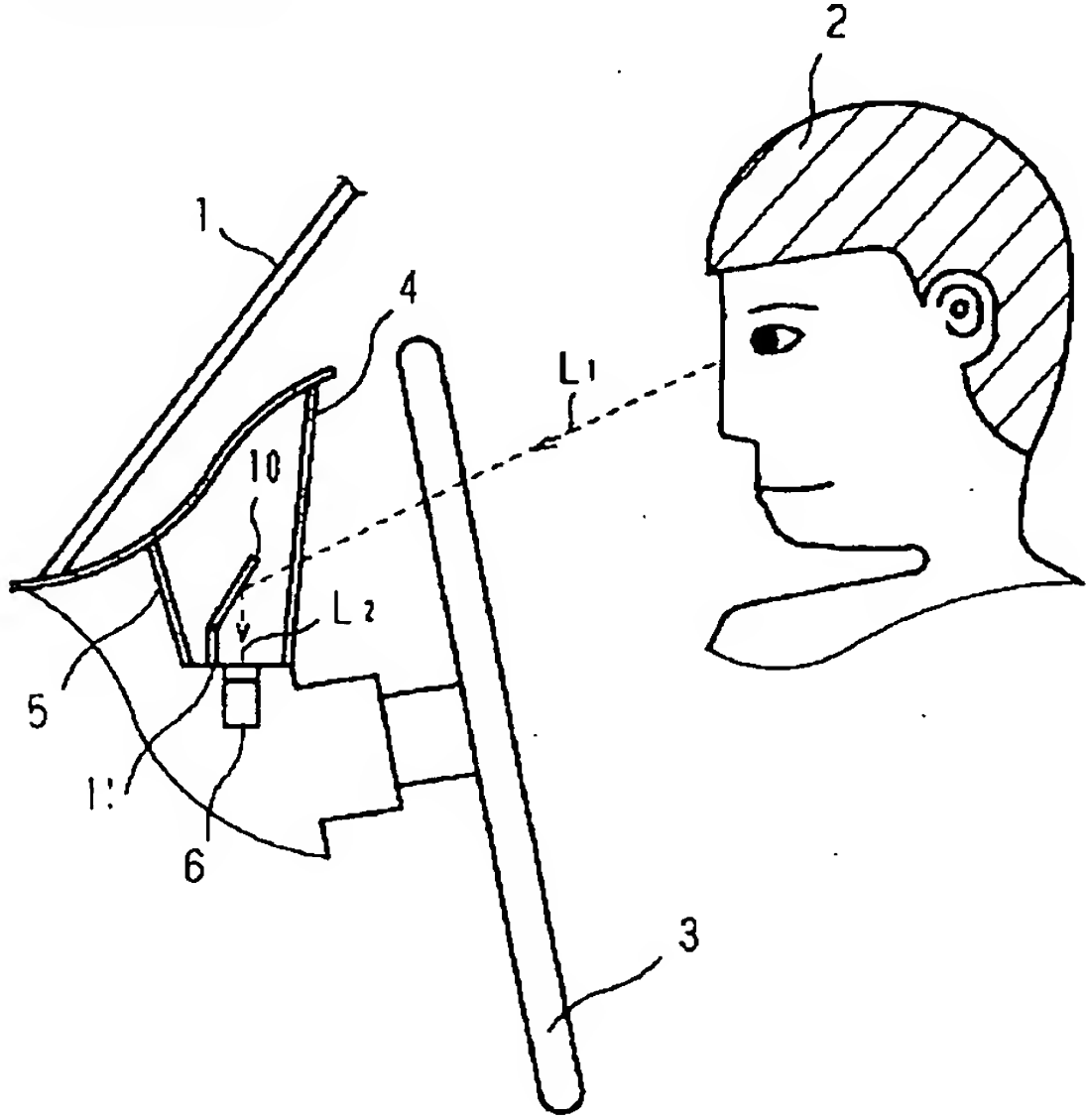
DRAWINGS

[Drawing 1]

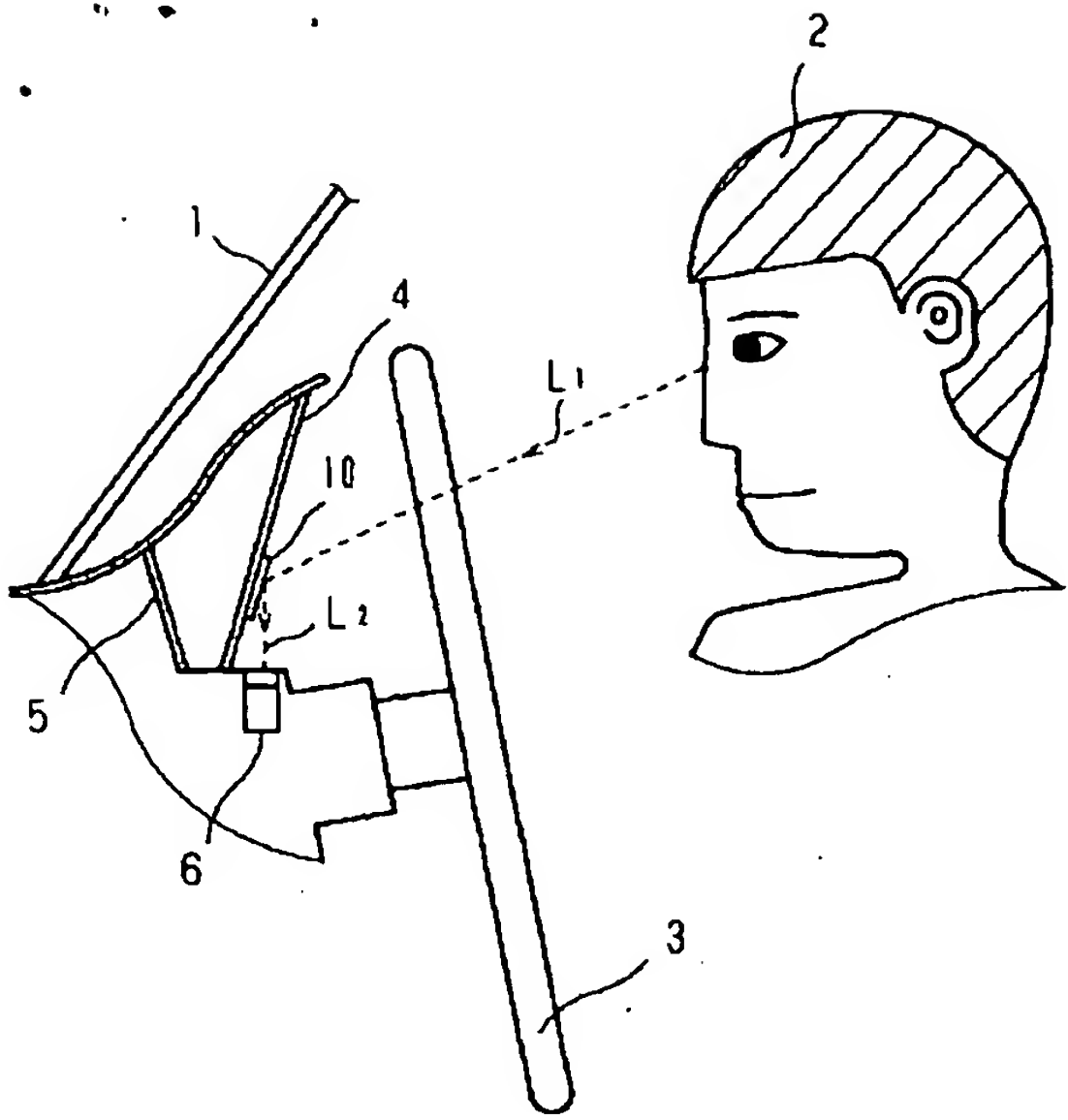


- 2 : 運転者
- 4 : インstrumentパネル透明カバー
- 5 : インstrumentパネル表面
- 6 : 撮影手段
- 10 : 光学的な光路誘導手段

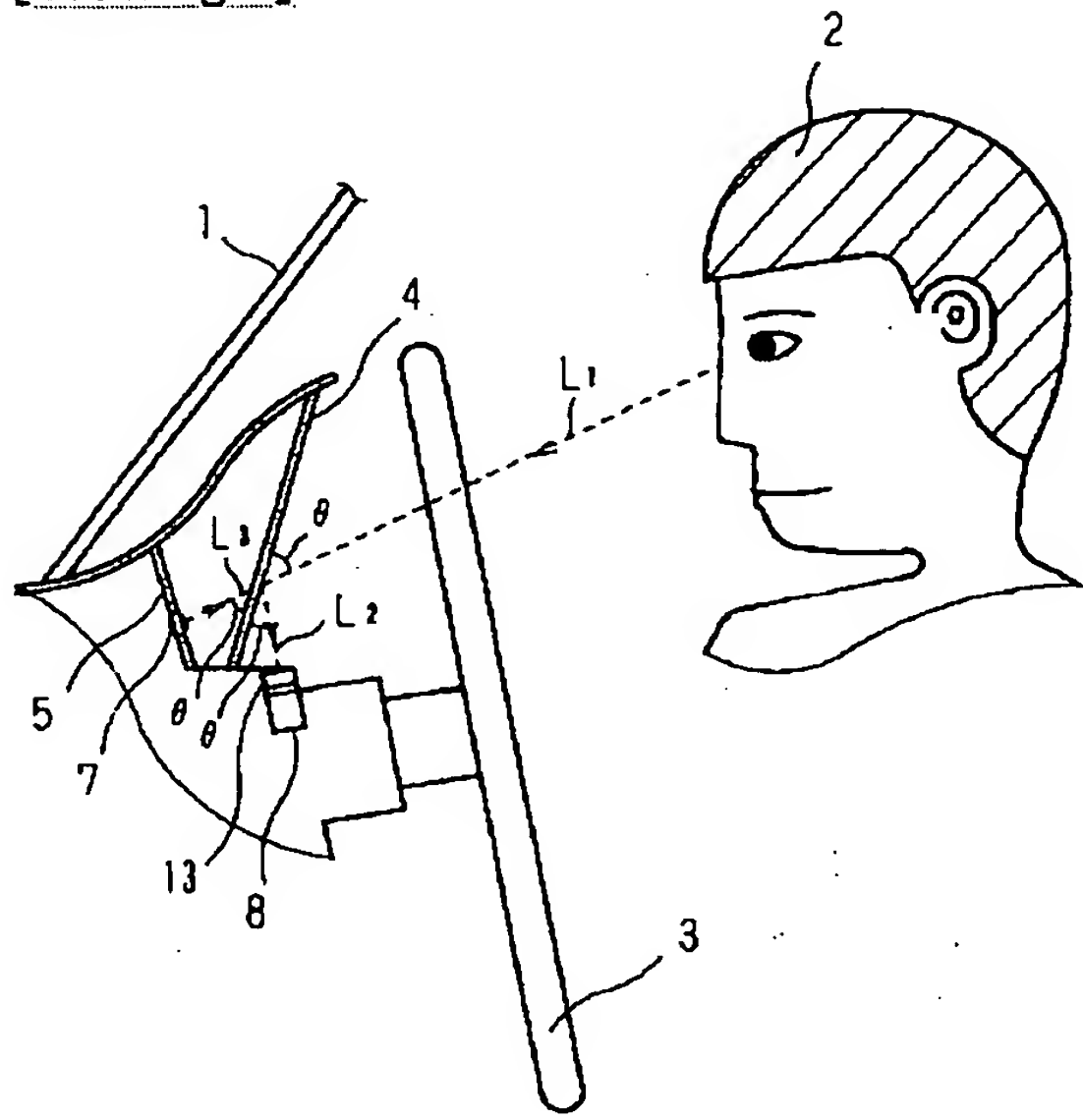
[Drawing 2]



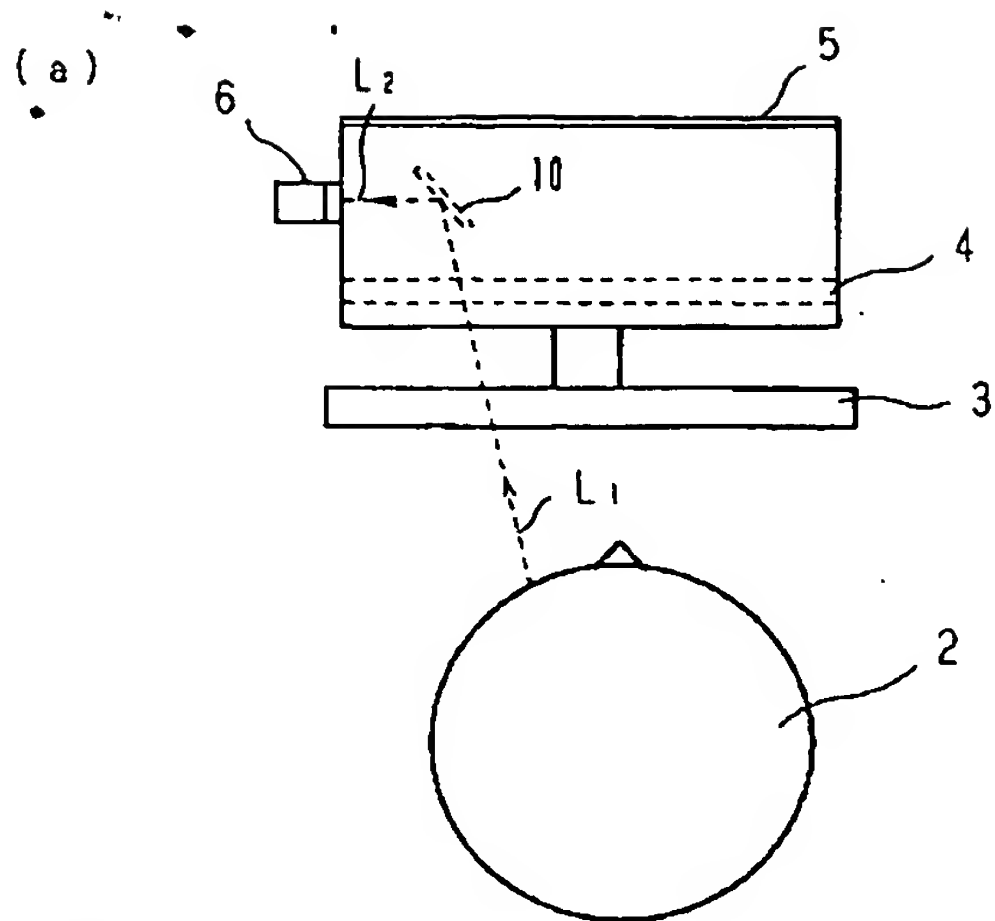
[Drawing 3]



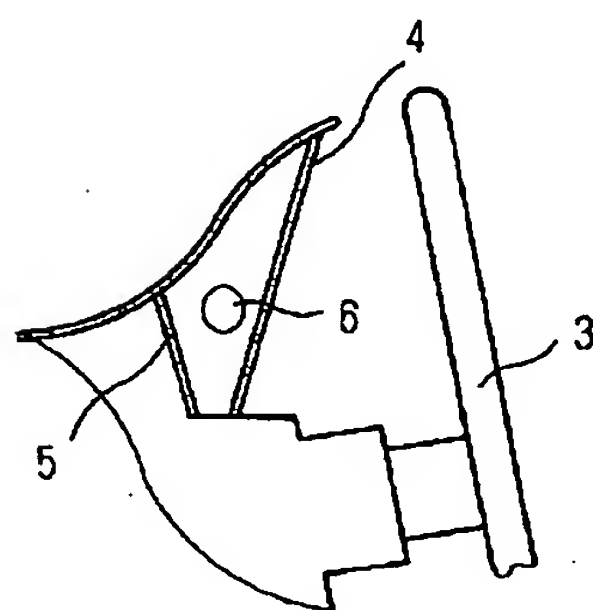
[Drawing 4]



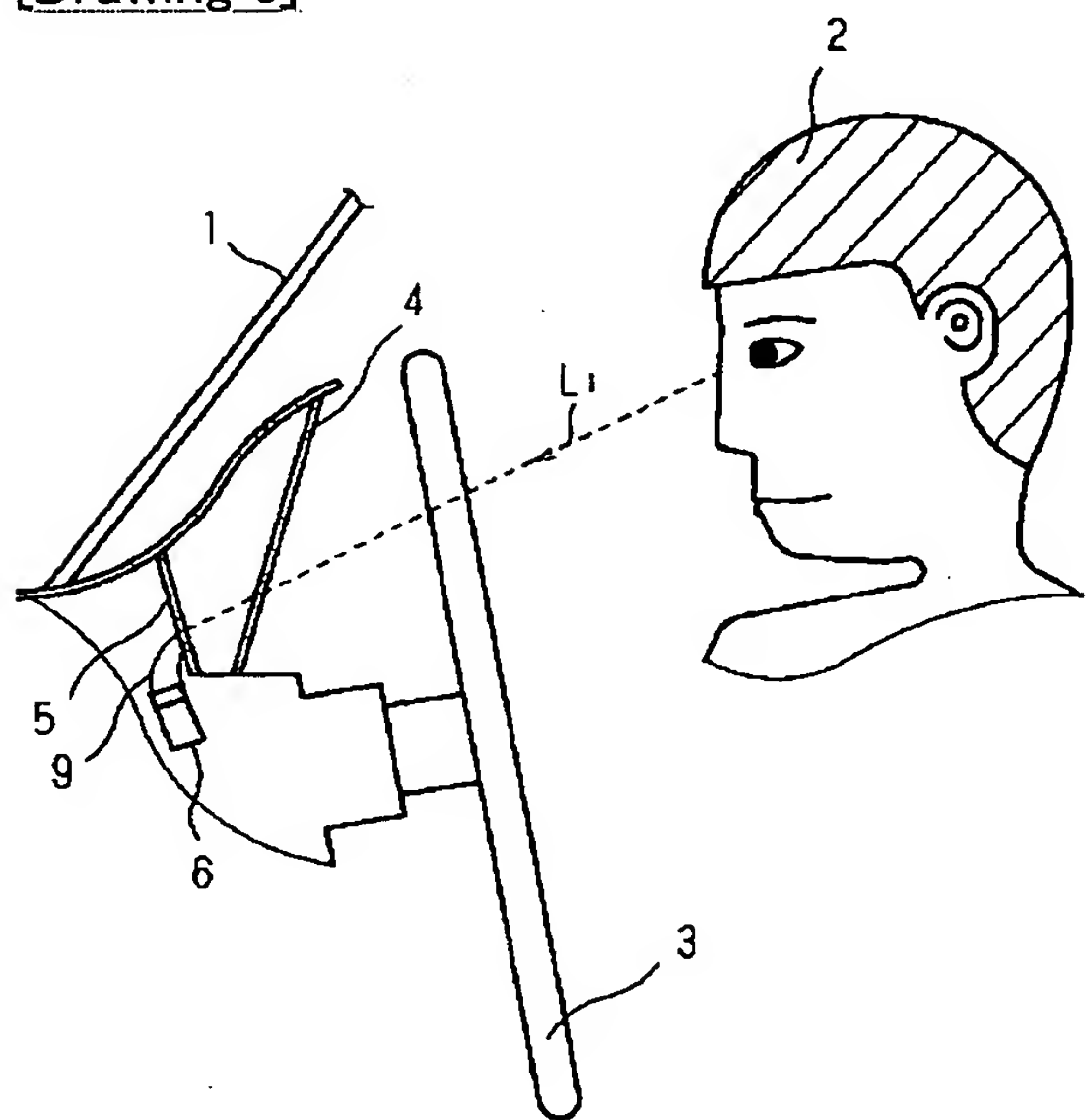
[Drawing 5]



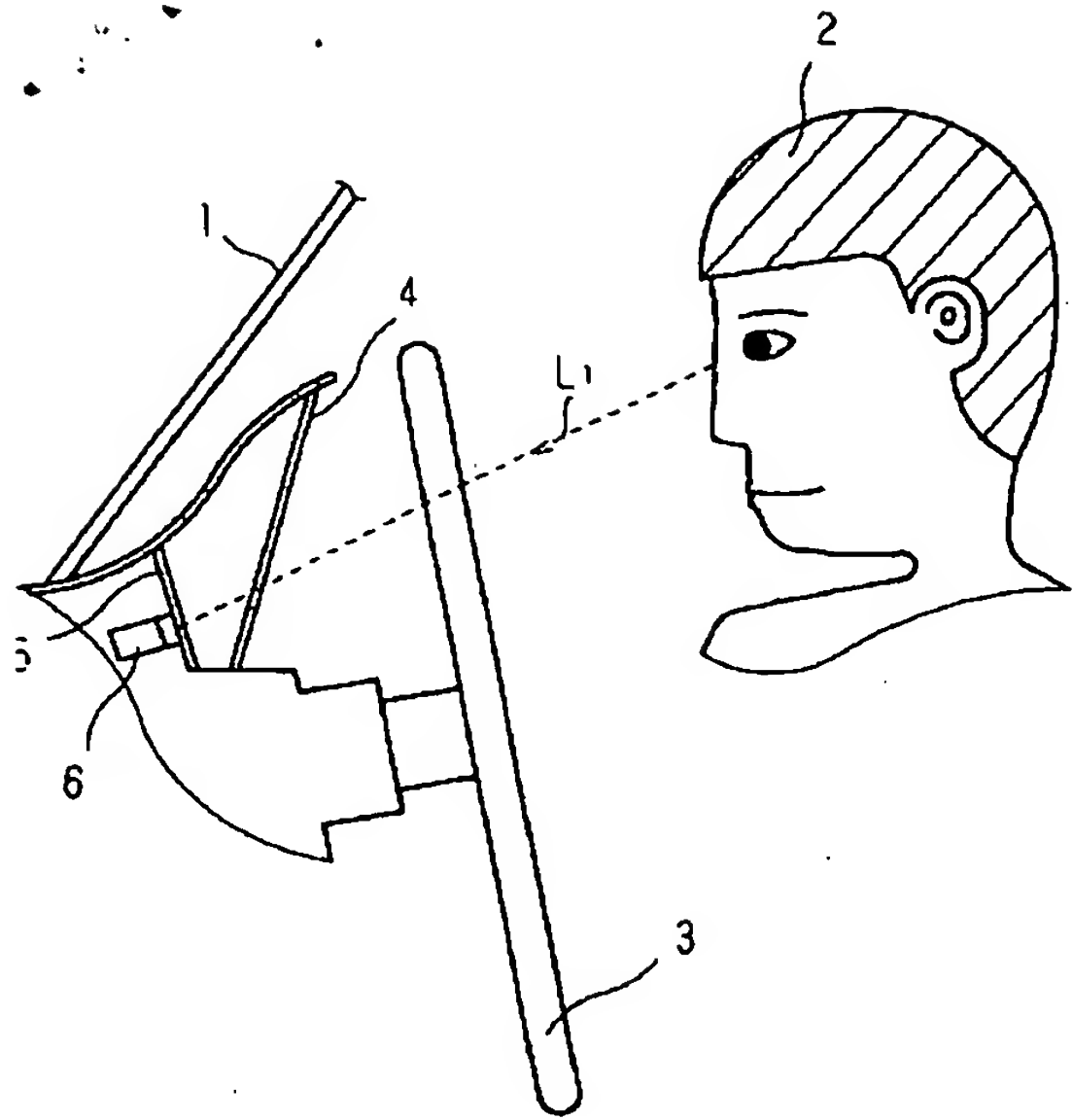
(b)



[Drawing 6]



[Drawing 7]



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[Item(s) to be Amended] drawing 4
[Method of Amendment] Modification
[Proposed Amendment]
[Drawing 4]

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